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A Key to the Families of Washington Plants



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AND
MRS. ELLA C. ENGSTROM



University of Washington
1908

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A Key to the Families of Ferns and Flowering Plants of Washington.

To be used with Watson's, Howell's, or Piper's Flora.

A. Pteridophytes (Fern Group).—Plants propagated by spores, not producing flowers. (Includes Ferns, Horse-tails, Club-Mosses, and a few others).

a. Stem erect, jointed. W-II-329, P-84, Equisetaceae.

aa. Stems not erect, not jointed.

b. Plants floating, small, about $\frac{1}{4}$ —1 inch long.

W-II-352, P-84, Salviniaceae.

bb. Plants not floating, larger.

c. Leaves divided into 4 palmately arranged leaflets.

W-II-351, P-84, Marsiliaceae.

cc. Leaves simple and entire.

d. Leaves grass-like; stems short, corn-like.

W-II-349, Isoetes in Selaginelleae; P-88, Isoetaceae. (1)

dd. Leaves scale-like; stems long, thin.

e. Spores all alike. W-II-349, P-86, Lycopodiaceae.

ee. Spores of 2 kinds unlike in size. W-II-349, Selaginella in Selaginelleae; P-87, Selaginellaceae. (1)

ccc. Leaves variously dissected or compounded.

d. Spore-bearing parts of leaves reduced to spikes or panicles; sporangia without ring; leaves not circinate in unfolding.

W-II-331, P-83, Ophioglossaceae.

dd. Spore-bearing parts of leaves neither reduced to spikes nor panicles; sporangia on under surface, with ring; leaves circinate in unfolding.

W-II-332, Filices; P-76, Polypodiaceae.

AA. Spermatophytes (Seed Plants).—Plants propagated by seeds, producing either flowers or some of the floral parts.

B. GYMNOSPERMS (Cone Bearers).—Trees or shrubs; cone-bearers (except TAXUS and JUNIPERUS); evergreen (except LARIX); leaves either needles or scales; ovules not enclosed in an ovary.

a. Fruit a red berry; ovule becoming a bony seed within a fleshy envelope or cup; leaves complanate, solitary, needle-like, flat, sharply acute or acuminate.

W-II-109, H-781, P-89, Taxus in Taxaceae.

aa. Fruit a cone, or a greenish or blue-black berry with a whitish bloom; ovules naked, at the base of a scale; leaves with not all the characteristics of TAXUS.

W-II-111, Coniferae; H-782, P-89, Pinaceae.

BB. ANGIOSPERMS (Ovary Plants).—Trees, shrubs or herbs; rarely cone bearers; mostly not evergreen; leaves rarely either needles or scales; ovules enclosed in an ovary.

C. MONOCOTYLEDONS.—Herbs; leaves usually parallel veined; if flowers are present then the parts are in 3's, rarely in 4's, never in 5's; wood in separate bundles scattered irregularly throughout the stem; cotyledon. 1.

D. Ovary superior or nearly so; perianth regular or none, often inconspicuous; annuals or perennials.

a. Plants free-floating, with no distinct stem; roots either unbranched or wanting. W-II-189, H-669, P-177, **Lemnaceae**.

aa. Plants not free-floating, with stem; roots mostly branched.

b. Flowers enveloped by chaffy bracts, and no other apparent perianth.

c. Perianth of numerous bristles; flowers in spikes 4 or more inches long and $\frac{3}{4}$ —1 inch in diameter; cat-tails.

W-II-188, H-667, P-95, **Typhaceae**. (2)

cc. Perianth of chaffy bracts; flowers either not in spikes, or not so large if so.

d. Chaffy bracts 6, similar; ovary 3-celled, or 1-celled with 3 parietal placentate, 3 to many seeded; rush-like or sedge-like; stems terete or flattened.

W-II-201, H-679, P-178, **Juncaceae**.

dd. Chaffy bracts 1, 2 or 3, not always similar; ovary 1-celled, 1-seeded; grass-like or sedge-like; stems various.

e. Flowers in heads. W-II-188, H-668, **Sparganium** in **Typhaceae**; P-95, **Sparganiaceae**. (2)

ee. Flowers in spikes or spikelets.

f. Stems solid, terete or triangular; sheaths closed; glumes single; filament attached to base of anther.

W-II-212, H-686, P-154, **Cyperaceae**.

ff. Stems hollow, terete; sheaths split; glumes in pairs; filament attached to middle of anther.

W-II-253, H-720, **Gramineae**; P-102, **Poaceae**.

bb. Flowers with green or colored perianth.

c. Plants with strong, skunk-like smell; leaves 1—3 feet long, oval.

W-II-187, H-667, P-177, **Araceae**.

cc. Plants without skunk-like smell; leaves less than 1 foot long, or not oval.

d. Leaves several in number, oval or ovate, all basal.

W-II-199, H-678, P-100, **Alismaceae**.

dd. Leaves fewer, or narrower, or not all basal.

e. Perianth corolla-like or rarely partly herbaceous; carpels united into a compound ovary.

f. Submerged aquatics, with linear grass-like leaves.

W-II-186, H-666, P-178, **Pontederiaceae**.

ff. Terrestrial, leaves various.

g. Fruit a fleshy berry; leaves broad. W-II-143,
Liliaceae; H-655, P-198, Convallariaceae. (3)

gg. Fruit a capsule; leaves various.

h. Plants mostly bulbous; pod loculicidal (except in CALOCHORTUS); style 1, or rarely 1 sessile stigma.

W-II-143, H-637, P-186, Liliaceae. (3)

hh. Plants rarely bulbous; pod mostly septical; styles 3, or 3 sessile stigmas.

W-II-143, Liliaceae;

H-661, P-195, Melanthaceae. (3)

ee. Perianth herbaceous or none; carpels 1, or distinct, or separable.

f. Perianth of bristles or chaffy scales; leaves linear, over 1 foot long.

g. Flowers in spikes, terminal.

W-II-188, H-667, P-95, Typhaceae. (2)

gg. Flowers in heads, axillary. W-II-188, H-667,
Sparganium in Typhaceae; P-95, Sparganiaceae. (2)

ff. Perianth herbaceous, or none; leaves not linear, or less than 1 foot long (except ZOSTERA).

g. Marsh plants; leaves terete or angular, bladeless; carpels united until maturity. W-II-190,

Naiadaceae; H-676, P-100, Scheuchzeriaceae. (4)

gg. Immersed aquatics; leaves flat, often linear; carpels distinct.

h. Flowers perfect; perianth of 4 distinct segments; leaves broad or linear.

W-II-190, H-670, Potamogeton in
Naiadaceae; P-96, Potamogetonaceae. (4)

hh. Flowers imperfect; or perianth none; leaves linear.

W-II-190, H-670, P-99, Naiadaceae. (4)

DD. Ovary inferior; perianth often irregular, conspicuous, colored; perennials.

a. Aquatic; leaves opposite or whorled, 1-veined; flowers monolcous or dioicous. W-II-129, H-670, Hydrocharidaceae; P-101, Vallesneriaceae.

aa. Terrestrial; leaves various; flowers perfect.

b. Flowers regular; stamens and style not coherent, stamens perigynous, anthers 3; leaves equitant. W-II-138, H-633, P-202, Iridaceae.

bb. Flowers very irregular; stamens and style coherent, anthers 1 or 2; leaves not equitant. W-II-130, H-624, P-205, Orchidaceae.

CC. DICOTYLEDONS.—Herbs, shrubs or trees; leaves netted-veined or with only 1 vein; parts of flowers rarely in 3's, mostly in

4's or 5's; wood in 1 circle or several concentric circles around a central pith; cotyledons 2.

D. CHORIPETALAE.—Petals wanting or distinct to base*

E. APETALAE.—Corolla and sometimes calyx wanting.*

F. Staminate flowers in aments, sometimes pistillate flowers also; trees or shrubs; leaves alternate.

- a. Ovary superior; pistillate flowers also in aments; monolcous or diolcous.
 - b. Calyx wanting; seed not winged; bracts thin in fruit.
 - c. Fruit a 1-seeded nutlet, wax-coated or drupe-like; bracts scaly; seeds not hairy. W-II-81, H-615, P-217, *Myricaceae*.
 - cc. Fruit a many seeded capsule; bracts herbaceous; seeds hairy. W-II-82, H-616, P-211, *Salicaceae*.
 - bb. Calyx present; seed a winged nutlet; bracts thick in fruit. W-II-79, H-613, P-218, *Betulaceae*. (5)
- aa. Ovary inferior; pistillate flowers few or solitary, not in aments; monolcous.
 - b. Nut in a folicaceous or tubular involucre; anther cells separate. W-II-100, H-612, *Corylaceae*; P-218, *Corylus* in *Betulaceae*. (5)
 - bb. Nut in a cup-like or spiny involucre; anthers 2-celled W-II-93, *Cupuliferae*; H-609, P-220, *Fagaceae*. (5)

FF. Flowers not in aments; trees, shrubs, or herbs; leaves opposite or alternate.

G. Ovary and fruit superior.

H. Ovary 1-celled and 1-ovuled; carpels distinct if more than 1.

I. Herbs, sometimes woody at base.

- a. Stipules sheathing the stem at nodes. W-II-6, H-567, P-224, *Polygonaceae*.
- aa. Stipules not sheathing the stem, or none.
 - b. Pistils several and distinct. W-I-2, H-7, P-265, *Ranunculaceae*.
 - bb. Pistil 1
 - c. Leaves trifoliate, all from the ground; plants in damp woods. W-I-14, H-28, P-282, *Achlys* in *Berberidaceae*.
 - cc. Leaves divided into linear segments; plants submerged acquatics. W-II-78, H-215, P-265, *Ceratophyllaceae*.

*Since the division into *Choripetalae* and *Sympetalae*, and again of the *Choripetalae* into *Apetalae* and *Polypetalae*, is a natural one and based upon evolution, the key characters given do not hold for all; but when the characters do not hold, the plant is provided for under both groups.

ccc..Leaves neither trifoliate nor of linear segments; plants nearly all terrestrial.

d. Stipules present.

e. Leaves opposite.

W-II-63, H-602, P-221, *Urtica* in *Urticaceae*. (6)

ee. Leaves alternate.

f. Leaves with 3 toothed lobes.

W-I-164, H-171, P-328, *Alchemilla* in *Rosaceae*.

ff. Leaves entire in nearly all; lobes not toothed when present. W-II-6, H-567, P-224, *Polygonaceae*.

dd. Stipules none.

e. Perianth 6-toothed or 6-parted.

W-II-6, H-567, P-224, *Polygonaceae*.

ee. Perianth 3—5 lobed or toothed, or of distinct sepals.

f. Leaves opposite, not scales.

W-II-1, H-565, P-244, *Nyctaginaceae*.

ff. Leaves alternate, or scales.

g. Leaves entire, lanceolate, 3-nerved.

W-II-63, H-603, P-221, *Parietaria* in *Urticaceae*. (6)

gg. Leaves with not all 3 of these characteristics.

h. Flowers bracted, the bracts and also the sepals mostly scarious

W-II-40, H-589, P-244, *Amaranthaceae*.

hh. Flowers bractless, or if bracted the bracts not scarious; sepals green or greenish.

W-II-43, H-590, P-239, *Chenopodiaceae*.

II..Shrubs or trees.

a. Leaves opposite, compound. W-I-471, H-439, P-449, *Fraxinus* in *Oleaceae*.

aa. Leaves opposite, simple.

W-II-62, H-600, P-397, *Lepargyrea* (*Shepherdia*) in *Eleagnaceae*.

aaa. Leaves alternate, simple.

b. Leaves quite unequal at base; trees.

H-601, P-221, *Celtis* in *Ulmaceae*. (6)

bb. Leaves quite or almost equal at base; mostly not trees.

c. Fruit a tailed akene; flowers perfect; calyx narrowly tubular.

W-I-164, H-166, P-328, *Cercocarpus* in *Rosaceae*. (7)

cc. Fruit a utricle; flowers unisexual; calyx not tubular.

W-II-43, H-590, P-239, *Chenopodiaceae*.

HH. Ovary and fruit of 2 or more united carpels.

a. Plants without green foliage.

W-I-450, *Monotropaceae*; H-426, P-435, *Allotropa* in *Monotropaceae*. (8)

aa. Plants with green foliage.

b. Plants with milky juice.

W-II-72, H-603, P-381, *Euphorbiaceae*.

bb. Plants without milky juice.

c. Leaves in whorls.

- W-I-252, H-241, Mollugo in Ficoideae; P-245, Aizoaceae.
- cc. Leaves alternate.
- d. Herbs.
- W-I-45, H-62, Lepidium in Cruciferae; P-285, Brassicaceae.
- dd. Shrubs or trees. W-I-99, H-112, P-386, Rhamnaceae.
- ccc. Leaves opposite.
- d. Shrubs or trees; leaves lobed or compound.
- W-I-106, Acerineae; H-116, P-385, Aceraceae. (9)
- dd. Herbs; leaves entire, simple.
- e. Aquatic; styles 2; fruit 4-lobed or 4-celled; stamen 1.
- H-217, Callitriche in Haloragaceae.
- W-II-76, P-382, Callitrichaceae.
- ee. Not aquatic; style 1; fruit 1-celled; stamens alternate with the sepals.
- W-I-466, H-431, P-444, Glaux in Primulaceae.
- eee. Not aquatic; styles or stigmas 3; fruit 1-celled; stamens opposite the sepals.
- W-I-61, H-73, Caryophyllaceae; P-252, Silenaceae.

GG. Ovary and fruit inferior.

- a. Plants parasitic on branches of conifers.
- W-II-104, H-608, P-222, Loranthaceae.
- aa. Plants not parasitic on branches, sometimes on roots.
- b. Shrubs.
- W-II-62, H-600, P-397, Lepargyrea (Shepherdia) in Eleagnaceae.
- bb. Herbs.
- c. Leaves palmately veined.
- d. Leaves entire.
- W-II-101, H-606, P-223, Asarum in Aristolochiaceae.
- dd. Leaves not entire.
- e. Leaves deeply 3-parted, the lobes again sharply toothed; stipules conspicuous, toothed.
- W-I-164, H-166, P-328, Alchemilla in Rosaceae.
- ee. Leaves not 3-parted, often lobed; stipules inconspicuous, not toothed. W-I-192, H-188, P-310, Saxifragaceae. (10)
- cc. Leaves pinnately veined, or 1-veined.
- d. Leaves alternate, entire.
- W-II-103, H-607, P-223, Santalaceae.
- dd. Leaves opposite or whorled, entire or not entire.
- e. Aquatic or marsh plants.
- f. Leaves in whorls, or if opposite pinnately divided into linear segments.
- W-I-214, H-217, Haloragaceae; P-411, Haloragidaceae.
- ff. Leaves opposite, entire. W-I-216, H-220, P-398, Isnardia (Ludwigia) in Onagraceae.
- ee. Not aquatic nor marsh plants.
- f. Leaves entire. W-II-1, H-565, P-244, Nyctaginaceae.
- ff. Leaves not entire. W-II-445, H-188, P-310, Crysosplenium in Saxifragaceae. (10)

EE. POLYPETALAE.—Corolla and calyx both present, the former of separate petals.

F. Stamens numerous, at least more than 10, and more than double the number of petals.

G. Stamens on the receptacle, free from the ovary and calyx (hypogynous).

a. Leaves in whorls, composed of linear segments; immersed aquatic.

W-II-78, H-215, P-265, *Ceratophyllaceae*.

aa. Leaves not in whorls, not composed of linear segments (except in a few plants); mostly not immersed aquatics.

b. Pistils more than 1.

c. Leaves peltate. W-I-16, H-29, P-264, *Brasenia* in *Nymphaeaceae*.

cc. Leaves not peltate. W-I-2, H-7, P-265, *Ranunculaceae*.

bb. Pistil only 1.

c. Pistil simple. W-I-2, H-7, P-265, *Ranunculaceae*.

cc. Pistil compound.

d. Petals more numerous than the sepals.

e. Leaves not entire.

W-I-18, H-31, P-283, *Papaveraceae*. (11)

ee. Leaves entire.

f. Sepals 8—12; leaves floating, 4—12 inches long.

W-I-16, H-29, P-264, *Nymphaeaceae*.

ff. Sepals 2—8; leaves not floating, smaller.

W-I-73, H-90, P-245, *Portulacaceae*.

dd. Petals of the same number as the sepals.

e. Leaves opposite. W-I-80, H-99, P-390, *Hypericaceae*.

ee. Leaves alternate.

f. Leaves simple. W-I-82, H-100, P-388, *Malvaceae*.

ff. Leaves compound.

g. Leaflets obcordate; sap sour.

W-I-93, *Oxalideae*; H-109, P-380, *Oxalidaceae*. (12)

gg. Leaflets not obcordate; sap not sour.

W-I-49, H-66, P-307, *Capparidaceae*.

GG. Stamens borne on the free or adnate calyx (perigynous or epigynous).

a. Plants fleshy, leafless, prickly; ovary 1-celled.

W-I-242, H-241, P-396, *Cactaceae*.

aa. Plants fleshy, leafy, not prickly; ovary 1-celled.

W-I-73, H-90, P-245, *Portulacaceae*.

aaa. Plants not fleshy, leafy, sometimes prickly; ovary various.

b. Leaves opposite.

W-I-192, *Hydrangeae*; H-205, P-327, *Hydrangeaceae*. (10)

bb. Leaves alternate.

c. Herbs.

d. Stipules wanting.

W-I-235, H-239, P-395, *Loasaceae*.

dd. Stipules present

W-I-164, suborder *Rosaceae*; H-166, P-328, *Rosaceae*. (7)

cc. Shrubs or trees.

(*Rosaceae* of Gray and Watson).

d. Leaves compound.

e. Leaves pinnately compound; plants not prickly.

Genus *Pyrus* (Sorbis); W-I-166, **Pomeae;**
H-163, **Pomaceae;** P-345, **Malaceae.** (7)

ee. Leaves not pinnately compound; plants prickly.

W-I-164, suborder **Rosaceae;** H-166, P-328, **Rosaceae.** (7)

dd. Leaves simple.

e. Ovary inferior.

W-I-166, **Pomeae;** H-163, **Pomaceae;** P-345, **Malaceae.** (7)

ee. Ovary superior or nearly so.

f. Leaves entire.

g. Pistil 1; leaves $\frac{1}{2}$ — $1\frac{1}{2}$ inches long. W-I-164,
H-172, P-328, **Cercocarpus** in **Rosaceae.** (7)

gg. Pistils 2—5; leaves 2—6 inches long.

Genus *Osmaronia* (Nuttallia); W-I-164
Amygdaleae; H-162, P-348, **Amygdalaceae.** (7)

ff. Leaves not entire.

g. Pistil 1; leaves not 3-toothed at apex.

Genus *Prunus*; W-I-164, **Amygdaleae.**
H-160, P-348, **Amygdalaceae.** (7)

gg. Pistils more than 1; leaves 3-toothed at apex.
W-I-164, H-166, P-328, **Rosaceae.** (7)

**FF. Stamens 10 or less; or if more not exceeding
twice the number of petals, or of sepals if the
petals are wanting.**

**G. Ovary or ovaries superior or mainly so (some-
times enclosed in the calyx tube).**

H. Pistils more than 1 and distinct.

**a. Pistils of the same number as the petals and as the sepals; leaves
fleshy, pinnately veined or 1-veined.**

W-I-208, H-211, P-308, **Crassulaceae.**

**aa. Pistils not corresponding in number with the petals and sepals; leaves
not fleshy, or if so neither pinnately veined nor 1-veined.**

b. Stamens borne on the receptacle. W-I-2, H-7, P-265, **Ranunculaceae.**

bb. Stamens borne on the calyx.

c. Stipules none or indistinct.

W-I-192, **Saxifrageae;** H-188, P-310, **Saxifragaceae.** (10)

cc. Stipules persistent, distinct.

d. Shrubs; leaves simple, entire.

e. Tall, erect shrub; leaves $1\frac{1}{2}$ —6 inches long.

Genus *Osmaronia* (Nuttallia); W-I-164, **Amygdaleae;**
H-160, P-348, **Amygdalaceae.** (7)

ee. Small, depressed shrub; leaves shorter.

- W-I-164, H-166, P-328, *Spiraea* in **Rosaceae**. (7)
 dd. Herbs; or if not, then leaves compound or not entire.
 W-I-164, suborder **Rosaceae**; H-166, P-328, **Rosaceae**. (7)

HH. Pistil only 1.

- I. Pistil simple, as shown by the single style, stigma and cell of the ovary.
- a. Flowers irregular; leaves pinnately 2-compound.
 W-I-111, H-122, **Papilionaceae**; P-349, **Fabaceae**. (13)
- aa. Flowers regular; leaves simple or only 1-compound.
- b. Herbs.
- c. Leaves ternately compound, without stellate pubescence.
 W-I-14, H-27, P-282, **Berberidaceae**.
- cc. Leaves simple or pinnately compound; without stellate pubescence.
 W-I-164, suborder **Rosaceae**; H-166, P-328, **Rosaceae**. (7)
- ccc. Leaves simple; densely covered with stellate pubescence.
 W-II-67, H-603, P-381, *Piscaria* (*Eremocarpus*) in **Euphorbiaceae**.
- bb. Shrubs.
- c. Leaves compound.
- d. Stems prickly; leaves deciduous; leaf margin not prickly.
 W-I-164, H-166, P-328, *Rosa* in **Rosaceae**. (7)
- dd. Stems not prickly; leaves evergreen; leaf margin prickly.
 W-I-14, H-27, P-282, *Berberis* in **Berberidaceae**.
- ddd. Stems not prickly; leaves deciduous; leaf margin not prickly. Genus *Pyrus* (*Malus*); W-I-189, **Pomeae**;
 H-163, **Pomaceae**; P-345, **Malaceae**. (7)
- cc. Leaves simple
- d. Leaves entire.
 Genus *Forsellesia* (*Glossopetalon*); W-I-108, **Sapindaceae**;
 H-166, **Aceraceae**; P-384, **Celastraceae**. (9)
- dd. Leaves not entire.
- e. Ovary 1-celled; stone fruit.
 W-I-164, **Amygdaleae**; H-160, P-348, **Amygdalaceae**. (7)
- ee. Ovary more than 1-celled; not stone fruit. W-I-166, **Pomaceae**; H-163, **Pomaceae**; P-345, **Malaceae**. (7)

II. Pistil compound as shown by the number of stigmas, styles, cells of ovary, or placentae.

J. Trees or shrubs.

- a. Leaves compound.
- b. Shrubs; leaves alternate. W-I-109, H-118, P-383, **Anacardiaceae**.
- bb. Trees; leaves opposite.
- c. Stamens 2—3; leaves 5—7 foliate; fruit 1-winged.
 W-I-471, H-438, P-449, *Fraxinus* in **Oleaceae**.

- cc. Stamens 4—8; leaves simple or 3-foliate; fruit 2-winged.
W-I-106 *Acerineae*; H-116, P-385, *Aceraceae*. (9)
- aa. Leaves simple.
 - b. Leaves opposite or whorled.
 - c. Leaves palmately lobed.
W-I-106, *Acerineae*; H-116, P-385, *Aceraceae*. (9)
 - cc. Leaves not lobed, mostly pinnate, often serrate.
 - d. Leaves 3-veined from the base.
W-I-192, *Hydrangeae*; H-205, P-327, *Hydrangeaceae*. (10)
 - dd. Leaves 1-veined from the base.
 - e. Prostrate shrub, much branched; leaves deciduous.
W-I-99, H-112, P-386, *Ceanothus* in *Rhamnaceae*.
 - ee. Depressed shrub, a foot or less high, with few or no branches; leaves evergreen. Genus *Chimaphila*;
W-I-449, *Pyroleae*; H-423, P-432, *Pyrolaceae*. (8)
 - eee. Erect shrub, taller, branched considerably; leaves evergreen or deciduous. W-I-98, H-111, P-384, *Celastraceae*.
 - bb. Leaves alternate.
 - c. Leaves densely tomentose beneath with long brownish hairs.
Genus *Ledum*; W-I-449, *Ericineae*; H-413, P-436, *Ericaceae*. (8)
 - cc. Leaves not so.
 - d. Leaves 1 inch long or longer.
W-I-99, H-112, P-386, *Rhamnaceae*.
 - dd. Leaves $\frac{1}{2}$ inch long or shorter.
 - e. Leaf margin revolute; leaves not densely clothing stem; prostrate plants, in peat bogs.
H-410, P-442, *Oxycoccus* in *Vacciniaceae*. (8)
 - ee. Leaf margin not revolute; leaves densely clothing stem; diffuse or spreading plant, in rocky places.
H-606, P-383, *Empetrum* in *Empetraceae*.
 - eee. Leaf margin not revolute; leaves not densely clothing stem; erect shrub, on dry soil.
Genus *Forsellesia* (*Glossopetalon*); W-I-105, *Sapindaceae*;
H-116, *Aceraceae*; P-384, *Celastraceae*. (9)

JJ. Herbs.

K. Leaves opposite or whorled.

- a. Ovary 1-celled.
 - b. Ovary with 2 or more parietal placentae.
W-I-192, *Saxifrageae*; H-188, P-310, *Saxifragaceae*. (10)
 - bb. Ovary either with central placenta or seeds from base.
 - c. Leaves not entire. W-I-80, H-98, P-391, *Elatinaceae*.
 - cc. Leaves entire.
 - d. Sepals 2. W-I-73, H-90, P-245, *Portulacaceae*.
 - dd. Sepals more than 2.
 - e. Calyx petal-like, but corolla none.

- W-I-466, H-431, P-444, Glaux in **Primulaceae**.
 ee. Calyx not petal-like, corolla present.
 f. Petals and stamens inserted on the calyx.

- W-I-213, H-216, P-397, **Lythraceae**.
 ff. Petals and stamens inserted on the receptacle.

- W-I-61, H-73, **Caryophyllaceae**; P-252, **Silenaceae**.
 aa. Ovary more than 1-celled.
 b. Plants with milky juice. W-II-67, H-603, P-381, **Euphorbiaceae**.
 bb. Plants without milky juice.

- c. Leaves palmately veined; or with more than 1 chief vein from the base; or either deeply lobed or dissected, or compound.
 d. Ovary 5-lobed, 5-celled.

- W-I-93, **Geranieae**; H-105, P-378, **Geraniaceae**. (12)
 dd. Ovary less than 5-lobed or not lobed, less than 5-celled.

- W-I-192, **Saxifrageae**; H-188, P-310, **Saxifragaceae**. (10)
 cc. Leaves pinnately veined; or 1-veined; neither lobed, nor deeply notched, nor compound.

- d. Leaves in whorls, entire.

- Genus *Mollugo*; W-I-250, H-241, **Ficoideae**; P-245, **Alzooaceae**.
 dd. Leaves opposite, or if whorled not entire.

- e. Perianth wanting; flowers monoicous; stamen 1; leaves not basal, all opposite, entire. Genus *Callitriche*;
 H-217, **Halorageae**; W-II-76, P-382, **Callitrichaceae**.

- ee. Perianth present; flowers perfect; stamens 5 or 10; leaves either basal or alternate or opposite, entire or not.

- f. Leaves not basal, all opposite; stamens 5 or 10; ovary not lobed at summit.

- W-I-80, H-98, P-391, **Elatinaceae**.
 ff. Leaves often basal, alternate or opposite; stamens 10; ovary 2-lobed at summit. W-I-192,
 H-188, P-310, *Saxifraga* in **Saxifragaceae**. (10)

- fff. Leaves basal; stamens 10; ovary 4 or 5 lobed.

- W-I-449, **Pyroleae**; H-423, P-432, **Pyrolaceae**. (8)

KK. Leaves alternate.

L. Ovary 1-celled.

- a. Plants with milky juice, densely covered with stellate pubescence.

W-I-67, H-603, P-381, *Piscaria* (*Eremocarpus*) in **Euphorbiaceae**.

- aa. Plants without milky juice, without stellate pubescence.

- b. Plants of peat bogs; leaves all basal, reddish, covered with glandular hairs. W-I-212, H-214, P-307, **Droseraceae**.

- bb. Plants mostly not of peat bogs; leaves mostly not all basal, usually not reddish, not covered with glandular hairs.

- c. Ovary with central placenta. W-I-73, H-90, P-245, **Portulacaceae**.

- cc. Ovary with 1 or more parietal placentae.

- d. Plants without green foliage. Genus *Pleurocospora*;
W-I-450, *Monotropeae*; H-426, P-435, *Monotropaceae*.
- dd. Plants with green foliage.
 - e. Petals 5 or wanting; sepals or lobes of the corolla 5;
stamens 5 or 10.
 - f. Corolla irregular, lower petal spurred.
W-I-54, H-68, P-391, *Violaceae*.
 - ff. Corolla regular or nearly so, petals not spurred.
W-I-192, *Saxifrageae*; H-188, P-310, *Saxifragaceae*. (10)
 - ee. Petals 4 or 6; sepals 2 or 3; stamens few or many.
W-I-18, H-31, P-283, *Papaveraceae*. (11)
 - eee. Petals 4; sepals 4; stamens 6.
 - f. Stamens tetradynamous; leaves not palmately 3—5
spicuous. W-I-164,
W-I-25, H-35, *Cruciferae*; P-285 *Brassicaceae*.
 - ff. Stamens not tetradynamous; leaves palmately 3—5
foliate, entire or nearly so.
W-I-49, H-66, P-307, *Capparidaceae*.

LL. Ovary more than 1-celled.

- a. Plants with milky juice.
W-II-67, H-603, P-381, *Euphorbia* in *Euphorbiaceae*.
- aa. Plants without milky juice.
 - b. Flowers very irregular; leaves pinnately compound, of many leaflets.
W-I-111, H-119, *Astragalus* in *Papilionaceae*;
P-349, *Phaca* in *Fabaceae* (13)
 - bb. Flowers irregular; leaves simple.
H-110, *Balsaminaceae*; P-386, *Impatiens* (12)
 - bbb. Flowers regular or nearly so; leaves simple in most
 - c. Plants without green foliage.
 - d. Flowers solitary; or if not, petals saccate at base.
W-I-450, *Monotropeae*; H-426, P-435, *Monotropaceae*. (8)
 - dd. Flowers racemose; petals not saccate at base. Genus
Pyrola; W-I-449, *Pyroleae*; H-423, P-432, *Pyrolaceae*. (8)
 - cc. Plants with green foliage.
 - d. Sepals 3; petals 3; plants without peppery or radish taste.
H-108, P-383, *Floerkia* in *Limnanthaceae*. (12)
 - dd. Sepals 4; petals 4; plants with peppery or radish taste.
W-I-25, H-35, *Cruciferae*; P-285 *Brassicaceae*.
 - ddd. Sepals 5; petals 5; plants without peppery or radish taste.
 - e. Seeds numerous; anthers versatile, often opening by
pores; foliage leaves often all basal.
 - f. Ovary 4—5 celled; leaves simple, pinnately veined,
entire or slightly notched; anthers opening by
pores. Genus *Pyrola*;
W-I-449, *Pyroleae*; H-423, P-432, *Pyrolaceae*. (8)
 - ff. Ovary 2—3 celled; leaves sometimes compound, often

palmately veined, often deeply notched; anthers not opening by pores. W-I-192,

Saxifrageae; H-188, P-310, **Saxifragaceae**. (10)

ee. Seeds 10 or less; anthers not versatile, nor opening by pores; foliage leaves not all basal.

f. Leaves entire, pinnately veined or 1-veined, simple; pod not long-beaked.

W-I-88, H-103, P-380, **Linaceae**.

ff. Leaves not entire, palmately veined if simple, sometimes compound; pod long-beaked.

W-I-93, **Geranieae**; H-105, P-378, **Geraniaceae**. (12)

GG. Ovary inferior or mainly so.

H. Trees or Shrubs.

a. Leaves alternate.

b. Leaves compound, or more or less distinctly palmately lobed.

c. Flowers in umbels; ultimate branchlets $\frac{1}{2}$ to $\frac{3}{4}$ inch in diameter; plants with very few branches.

W-I-237, H-270, P-412, **Araliaceae**.

cc. Flowers solitary or in racemes; ultimate branchlets thinner; plants with normal branching.

Genus *Ribes*.

W-I-204, **Grossulariaceae**;

H-207, **Ribesaceae**; P-323, **Grossulariaceae**. (10)

bb. Leaves simple, not lobed.

c. Branches without spines.

W-I-99, H-112, P-386, **Rhamnaceae**.

cc. Branches with spines.

Genus *Crataegus*;

W-I-166, **Pomeae**; H-163, **Pomaceae**; P-345, **Malaceae**. (7)

aa. Leaves opposite or whorled.

b. Leaves with peltate or stellate hairs.

W-I-62, H-600, P-397, *Lepargyrea* (*Shepherdia*) in **Eleagnaceae**.

bb. Leaves without peltate or stellate hairs.

c. Plant prostrate. W-I-99, H-112, P-386, *Ceanothus* in **Rhamnaceae**.

cc. Plant erect or inclined.

W-I-274, H-271, P-431, **Cornaceae**.

HH. Herbs.

a. Vine with tendrils.

W-I-238, H-238, P-535, *Micrampelis* (*Marah*) in **Cucurbitaceae**.

aa. Not or hardly a vine, no tendrils.

b. Leaves whorled.

c. Submerged plant; leaves very much dissected.

Genus *Myriophyllum*;

W-I-214, H-217, **Halorageae**; P-411, **Haloragidaceae**.

cc. Plants of rather damp woods but not in water; leaves entire.

W-I-274, H-271, P-431, *Cornus* in **Cornaceae**.

bb. Leaves not whorled, alternate or opposite.

c. Styles 2—5, distinct, or when united below distinct above.

d. Flowers in umbels.

W-I-252, H-243, Umbelliferae; P-413, Apiaceae.

dd. Flowers not in umbels.

e. Leaves pinnately compound; if not so, stipules conspicuous.

W-I-164,

suborder Rosaceae; H-166, P-328, Rosaceae. (7)

ee. Leaves simple or ternately compound; stipules inconspicuous.

W-I-192,

Saxifragaceae; H-188, P-310, Saxifragaceae. (10)

cc. Style 1; stigmas 1—4.

d. Ovary 1-celled; stamens 20 or more.

W-I-235, H-239, P-395, Mentzelia in Loasaceae.

dd. Ovary 2—5 celled; stamens 12 or less.

W-I-216, H-220, P-398, Onagraceae.

DD. SYMPETALAE.—Calyx and corolla both present; petals more or less united into 1 piece.

E. Ovary superior, or mainly so.

F. Stamens as many as the lobes of the corolla and alternate with them, or fewer.

G. Plants with ordinary green herbage.

H. Corolla irregular; stamens (with anthers) 2, or 4 and didynamous; style 1.

a. Ovary 1-celled, many seeded.

W-I-586, H-543, Lentibulariaceae; P-523, Plinguiculariaceae.

aa. Ovary 2 or 4 celled, few or many seeded.

b. Ovary 2-celled; seeds many.

W-I-546, H-500, P-494, Scrophulariaceae.

bb. Ovary 4-celled; seeds 4 or fewer.

c. Ovary very deeply 4-lobed or 4-parted; flowers in whorls, not in terminal spikes.

W-I-589, H-544, Labiatae; P-486, Menthaceae.

cc. Ovary only slightly 4-lobed or terete; flowers not in whorls, in terminal spikes.

W-I-607, H-560, P-519, Verbenaceae.

HH. Corolla regular or nearly so; stamens not didynamous; styles various in number.

a. Trees.

W-I-471, H-439, P-449, Fraxinus in Oleaceae.

aa. Herbs

b. Corolla scarious and veinless; leaves all in a basal rosette, not linear.

W-I-610, H-561, P-523, Plantaginaceae.

bb. Corolla more or less velny; leaves not all in a basal rosette, or linear if so.

c. Plants with milky juice.

d. 2 distinct pistils, their styles and stigmas not united; stamens distinct; pollen of simple grains.

- W-I-472, H-439, P-452, **Apocynaceae**.
 dd. 2 distinct ovaries, with their styles and stigmas united;
 stamens mostly monadelphous; pollen united into waxy
 masses. W-I-474, H-440, P-453, **Asclepiadaceae**.
 cc. Plants without milky juice.
 d. Ovary deeply 4-lobed, forming 4 separate or separable nutlets.
 W-I-518, H-474, P-472, **Boraginaceae**.
 dd. Ovary not deeply 4-lobed, neither separating nor separable
 into nutlets.
 e. Style 3-cleft at apex; capsule 3-celled; corolla convolute.
 W-I-485, H-449, P-456, **Polemoniaceae**.
 ee. Styles or stigmas 1 or 2; capsule 1 or 2 celled; corolla
 convolute or not.
 f. Leaves opposite or whorled.
 g. Leaves entire. W-I-478,
 H-422, **Gentianeae**; P-449, **Gentianaceae**. (10)
 gg. Leaves lobed to dissected. W-I-501, H-463,
 P-467, **Nemophila** in **Hydrophyllaceae**.
 ff. Leaves alternate or basal, sometimes opposite near
 the base.
 g. Twining plants, vines. W-I-532,
 H-493, P-454, **Convolvulus** in **Convolvulaceae**.
 gg. Not twining plants, but a few of them vines.
 h. Leaves 3-foliate, or kidney-shaped, entire;
 swamp plants.
 W-I-479, H-442, **Menyantheae**;
 P-452, **Menyanthaceae**. (14)
 hh. Leaves not as above; only a few swamp
 plants.
 i. Leaves densely covered with branched
 hairs; or else swamp plants with
 leaves all basal.
 W-I-546, H-500, P-494, **Scrophulariaceae**.
 ii. Leaves without branched hairs; not
 basal-leaved swamp plants.
 j. Styles 2, or 1 which is 2-cleft (ex-
 cept in **ROMANZOFFIA**); fruit a
 capsule; capsule 1—2 celled;
 seeds few or numerous. W-I-501,
 H-463, P-467, **Hydrophyllaceae**.
 jj. Style 1, stigma usually 1; fruit a
 berry or capsule; seeds nu-
 merous. W-I-537,
 H-496, P-519, **Solanaceae**.

GG. Plants without green herbage.

- a. Vines, twining dexterously, white or yellow; ovary 2-celled, 1—4 seeded.
 W-I-532, **Cuscutineae**; H-495, **Cuscutae**; P-454, **Cuscutaceae**. (15)

- aa. Not vines, erect or nearly so; white, yellowish, brownish or purplish; ovary not 2-celled, many seeded.
- b. Flowers irregular; stamens didynamous, inserted on the tube of the corolla; ovary 1-celled. W-I-583, H-540, P-521, **Orobanchaceae**.
- bb. Flowers regular or nearly so; stamens not didynamous, inserted on the receptacle; ovary 1, 4, or 5 celled.
- c. Ovary 4—5 celled; plants reddish; almost if not entirely polypetalous.
Genus *Pyrola*; W-I-449, **Pyroleae**; H-423, P-432, **Pyrolaceae**. (8)
- cc. Plants not having all 3 of the above characteristics.
W-I-450, **Monotropeae**; H-426, P-435, **Monotropaceae**. (8)

FF. Stamens just as many as the lobes of the corolla and opposite them.

- a. Styles 5; ovary and fruit 1-seeded.
Genus *Static* (*Armeria*); H-430, **Armeriaceae**;
W-I-465, P-449, **Plumbaginaceae**.
- aa. Style 1; ovary and capsule more than 1-seeded.
W-I-466, H-431, P-444, **Primulaceae**.

FFF. Stamens more numerous than the lobes of the corolla.

- a. Leaves simple, margin entire or merely with shallow notches.
- b. Pistils several, simple; ovary 1-celled; leaves fleshy.
W-I-208, H-211, P-308, **Crassulaceae**.
- bb. Pistil 1, compound; Ovary 3—10 celled; leaves mostly coriaceous.
W-I-448, **Ericineae**; H-413, P-436, **Ericaceae**. (8)
- aa. Leaves compound, or dissected.
- b. Corolla regular; leaves palmately 3-foliate.
Genus *Oxalis*; W-I-93, **Oxalideae**; H-109, P-380, **Oxalidaceae**. (12)
- bb. Corolla irregular; leaves mostly not 3-foliate.
- c. Calyx 4—5 toothed; corolla of 5, more or less united petals; stamens 5, 9, or 10; pistil simple; stipules present.
W-I-111, H-119, **Papilionaceae**; P-349, **Fabaceae**. (13)
- cc. Calyx of 2 distinct sepals; corolla of 4, more or less united petals; stamens 6; pistil compound; stipules wanting.
W-I-23, H-33, **Fumariaceae**; P-283, **Papaveraceae**. (11)

EE. Ovary inferior, or mainly so.

- a. Flowers not in heads.
- b. Leaves alternate.
- c. Herbaceous vine, with tendrils; stamens 3, fewer than the lobes of the corolla.
W-I-238, H-238, P-535, *Micrampelis* (*Marah*) in **Cucurbitaceae**.
- cc. Shrubs or woody vines, without tendrils; stamens 8 or 10, more numerous than the lobes of the corolla.
W-I-449, **Vaccinieae**; H-410, P-442, **Vacciniaceae**. (8)

ccc. Herbs, not vines, without tendrils; stamens 4 or 5; lobes of the corolla 5. W-I-445, H-407, P-535, *Campanulaceae*.

bb. Leaves opposite or whorled.

c. Trees, shrubs, or woody vines, LINNAEA an herbaceous vine. H-277, *Viburnaceae*; W-I-277, P-528, *Caprifoliaceae*.

cc. Herbs, sometimes prostrate, but not distinctly vines.

d. Stamens 3, fewer than the lobes of the corolla; leaves opposite. W-I-286, H-286, P-532, *Valerianaceae*.

dd. Stamens 4—5, as many as the lobes of the corolla; leaves whorled or opposite. W-I-281, H-283, P-525, *Rubiaceae*.

aa. Flowers in heads.

b. Stamens 3, distinct; corolla 5-lobed; leaves opposite; plants without prickles, without milky juice; calyx various, often pappus.

W-I-286, H-286, P-532, *Valerianaceae*.

bb. Stamens 4, distinct; corolla 4-lobed; leaves opposite; plants with short stout prickles, without milky juice; calyx 4-toothed or 4-lobed, not pappus. H-289, P-535, *Dipsacus* in *Dipsaceae*.

bbb. Stamens 4—5, anthers mostly syngynous; corolla usually 5-toothed, rarely 4-toothed; leaves alternate or opposite; plants with or without prickles, often with milky juice; calyx various, usually pappus. (*Compositae* of Gray, Watson and Howell).

c. Flowers all ligulate; juice milky. H-291 and 386, *Liguliflorae*; W-I-297 and 422, P-537, *Cichoriaceae*. (16)

cc. Inner flowers tubular, outer ones ligulate and forming rays, or all flowers tubular; juice very rarely milky.

d. Stamens distinct or nearly so.

W-I-292, *AMBROSIEAE* of *Helianthoideae*; H-333, *IVEAE* and *AMBROSIEAE* of *Helianthoideae*; P-550, *Ambrosiaceae*. (16)

dd. Stamens with their anthers syngynous.

W-I-289, H-290, *Tubuliflorae*; P-552, *Asteraceae*. (16)

Differences in the Families of Plants, as given in Gray's, Watson's, Howell's, and Piper's Floras.

(1) SELAGINELLACEAE and ISOETACEAE of Piper=SELAGINELLEAE of Watson.

(2) TYPHACEAE of Gray, of Watson and of Howell=TYPHACEAE and SPARGANIACEAE of Piper.

(3) LILIACEAE of Watson is divided into subfamilies in Gray. In Howell and in Piper these subfamilies are grouped into several families: Smilax subfamily=SMILAXACEAE, Asparagus and Trillium subfamilies=CONVALLARIACEAE, Melanthium and Bellwort subfamilies=MELANTHACEAE, Lily subfamily=LILIACEAE.

(4) NAIADACEAE of Gray and of Watson=NAIADACEAE and SCHEUCHZERIAACEAE of Howell=NAIDACEAE, SCHEUCHZERIAACEAE and POTAMOGETONACEAE of Piper.

(5) CUPULIFERAE of Gray=FAGACEAE and BETULACEAE of Piper. FAGACEAE of Piper=FAGACEAE of Howell=CUPULIFERAE of Watson. BETULACEAE of Piper=BETULACEAE and CORYLACEAE of Watson and of Howell.

(6) URTICACEAE of Gray and of Watson has been separated into a number of families. Nettle subfamily of Gray=URTICACEAE of Howell and of Piper; Elm subfamily of Gray=ULMACEAE of Howell and of Piper; Hemp and Fig subfamilies of Gray=MORACEAE, however, this family is not represented in Washington.

(7) ROSACEAE of Gray and of Watson has been divided into several families. Almond and Plum subfamilies of Gray=AMYGDALAE of Watson=AMYGDALACEAE of Howell and of Piper; Rose subfamily of Gray=suborder ROSACEAE of Watson=ROSACEAE of Howell and of Piper; Apple subfamily of Gray=POMEAE of Watson=POMACEAE of Howell=MALACEAE of Piper.

(8) ERICACEAE of Gray and of Watson has been divided into 4 families. Heath subfamily of Gray=ERICINEAE of Watson=ERICACEAE of Howell and of Piper; Whortleberry subfamily of Gray=VACCINIEAE of Watson=VACCINIACEAE of Howell and of Piper; Pyrola subfamily of Gray=PYROLEAE of Watson=PYROLACEAE of Howell and of Piper; Indian Pipe subfamily of Gray=MONOTROPEAE of Watson=MONOTROPACEAE of Howell and of Piper.

(9) SAPINDACEAE of Gray and of Watson has been separated into several families. Maple subfamily of Gray=ACERINEAE of Watson=ACERACEAE of Howell and of Piper, except that Forsellesia (Glossopetalon) goes to CELASTRACEAE instead of ACERACEAE; the other subfamilies of Gray and of Watson are not represented in Washington.

(10) SAXIFRAGACEAE of Gray and of Watson has been divided into 3 families. Saxifrage subfamily of Gray=SAXIFRAGEAE of Watson=SAXIFRAGACEAE of Howell and of Piper; the genus Ribes, grouped as GROSSULARIEAE in Watson=RIBESACEAE of Howell=GROSSULARIACEAE of Piper; the re-

maining genera of Gray, grouped as HYDRANGEAE in Watson=HYDRANGEACEAE of Howell and of Piper.

(11) PAPAVERACEAE and FUMARIACEAE of Gray, of Watson and of Howell=PAPAVERACEAE of Piper.

(12) GERANIACEAE of Gray is in Watson divided into 3 tribes. GERANIEAE of Watson=GERANIACEAE of Howell and of Piper; LIMNANTHEAE of Watson=LIMNANTHACEAE of Howell and of Piper; OXALIDEAE of Watson=OXALIDACEAE of Howell and of Piper; the genus *Impatiens* of Gray, not included in Watson=BALSAMINACEAE of Howell=IMPATIENTACEAE of Piper.

(13) LEGUMINOSAE of Gray and of Watson has been divided into 3 families. Pulse subfamily of Gray=PAPILIONACEAE of Watson and of Howell=FABACEAE of Piper; the other of Gray's subfamilies are not represented in the Northwest.

(14) GENTIANACEAE of Gray, of Watson and of Howell has been divided into 2 families corresponding to the 2 subgroups of Watson and of Howell. GENTIANEAE of Watson and of Howell=GENTIANACEAE of Piper; MENYANTHEAE of Watson and of Howell=MENYANTHACEAE of Piper.

(15) CONVULVULACEAE of Gray, of Watson and of Howell has been divided into 2 families corresponding to their subgroups. *Convolvulus* subfamily of Gray=CONVOLVULAE of Watson and of Howell=CONVOLVULACEAE of Piper; *Dodder* subfamily of Gray=CUSCUTINEAE of Watson=CUSCUTEAE of Howell=CUSCUTACEAE of Piper.

(16) COMPOSITAE of Gray, of Watson and of Howell has been divided into 3 families. LIGULIFLORAE of these authors=CICHORIACEAE of Piper; a part of the HELIANTHOIDEAE of the TUBULIFORAE=AMBROSIACEAE of Piper; the remaining TUBULIFLORAE of these authors=ASTERACEAE of Piper.

